

Low-Cost, Manufacturable, 6-Inch Wafer Bonding Process for Next-Generation 5-Junction IMM+Ge Photovoltaic Devices, Phase I

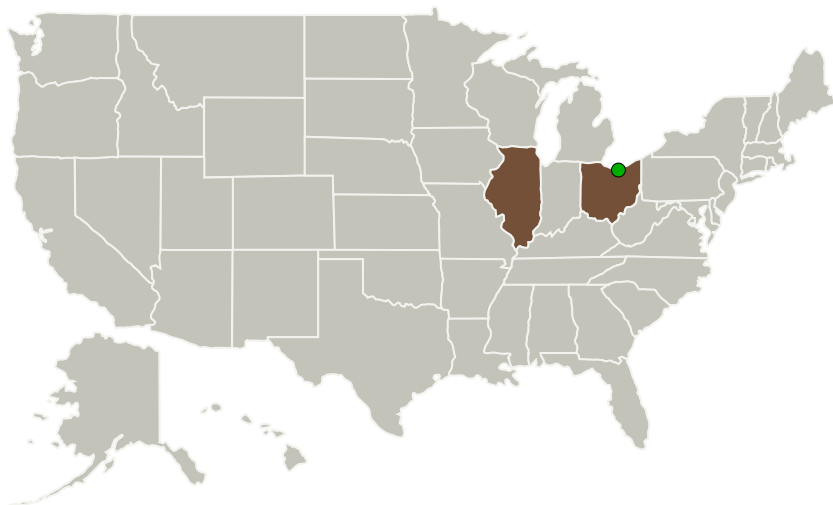
Completed Technology Project (2014 - 2014)



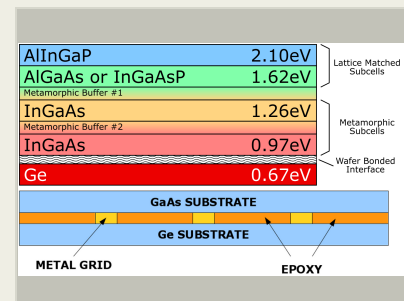
Project Introduction

We propose the development of a 6-inch wafer bonding process to allow bonding of a multi-junction inverted metamorphic (IMM) tandem solar cell structure to an upright single-junction Ge solar cell. The process will use SU8 epoxy to provide the mechanical connection between the substrates with an embedded metallic grid to provide electrical conductivity across the bonded interface. This process will enable the manufacture of next-generation, five-junction cells with the potential to achieve efficiency >37% under AM0 illumination in high-volume production. The proposed process will be designed for 6-inch substrates and will be low-cost, scalable, and high-yield. Compared to conventional wafer fusion approaches, this technique will be much more tolerant of the rough surfaces typical of metamorphic materials and eliminate the need for any pre-bonding surface polishing or preparation.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
MicroLink Devices, Inc.	Lead Organization	Industry Minority-Owned Business	Niles, Illinois
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio



Low-Cost, Manufacturable, 6-Inch Wafer Bonding Process for Next-Generation 5-Junction IMM+Ge Photovoltaic Devices Project Image

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Primary U.S. Work Locations

Illinois

Ohio

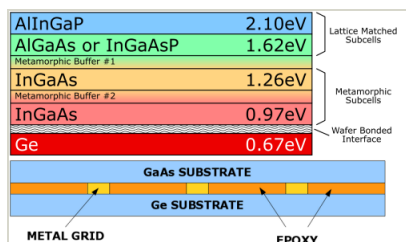
Project Transitions

**June 2014:** Project Start**December 2014:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140612>)

Images



Project Image

Low-Cost, Manufacturable, 6-Inch Wafer Bonding Process for Next-Generation 5-Junction IMM+Ge Photovoltaic Devices Project Image (<https://techport.nasa.gov/image/131887>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

MicroLink Devices, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

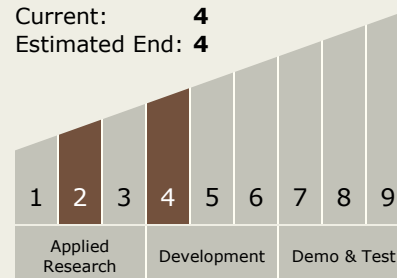
Carlos Torrez

Principal Investigator:

Victor C Elarde

Technology Maturity (TRL)

Start: 2
Current: 4
Estimated End: 4



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Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.1 Power Generation and Energy Conversion
 - └ TX03.1.1 Photovoltaic

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System